

Chapter 8

PRACTICAL EXERCISE

Creating Your Own Digital Mixing Console

Most modern digital mixing consoles are the equivalent of desktop computers, often running Windows or Linux, running custom mixing software that interacts with the mixing control surface and the audio input and output hardware. In this project you will create a small host-based digital mixing console using your own computer. You'll need a moving fader MIDI control surface such as the Behringer BCF2000, Mackie MCU Pro, or similar. You'll also need a multi-channel audio interface for the computer to collect the various audio inputs and send the mixes to physical outputs. You will build an audio mixing engine using the Max/MSP or PureData programming software. The goal is to create a digital mixing console that could be used practically on a small production.

As you work on the project, setting some milestones can help. The first milestone could contain at the very least, a full input to output signal path for a single input channel. The second milestone could contain at the very least full bi-directional MIDI control implementation between the MIDI control surface and the Max/MSP software for the controllable parameters of the single channel input channel. Then all you have to do is multiply what you've done by the number of mixing channels you want to have.

The mixing console you will be emulating is the Mackie 802-VLZ3. For more information on the console visit:

<http://www.mackie.com/products/802vlz3/>

Your virtual console should emulate the 802-VLZ3 as much as possible. The following minimum specifications should be achieved:

- 4 – Mono input channels
- A fixed 100 Hz high pass filter on every input channel with a bypass switch
- A fixed frequency and bandwidth 3-channel equalizer on each input channel
- One Aux send on each input channel with a master Aux level control that can be switched between pre and post fader that sends to a single physical output on your audio interface
- A main Left/Right output pair with a master volume fader control
- An Alt 3/4 output pair with a master volume fader control

- A pan knob on each input channel to pan between output pairs
- A Mute button on each input channel that doubles as a router for the Alt 3/4 output pair
- A PFL button on each input that routes signal to the headphone jack on your audio interface
- The ability to control selected parameters in the mixing software using the physical MIDI control surface.

Once the above minimum specifications have been achieved, here are some suggests for features you could implement that would improve the performance of the mixing console in a way that leverages the flexibility of digital technology:

- A preset scene list that allows you to store and recall the console settings in various configurations
- A custom designed graphical interface in the Presentation view of Max/MSP that hides all the patch chords and objects that to not require interaction from the user
- High resolution Peak Program Meters on all input, output, and PFL channels
- Page or Bank swap implementation on your control surface that allows all the mixing console parameters to be accessed without using the keyboard and mouse on the computer
- Variable bandwidth and center frequency control on the channel EQ
- Remote control of console parameters via MIDI, UDP, or OSC from another laptop, tablet, or smartphone
- Other feature enhancements not found on the 802-VLZ3 due to cost or the limitations of an analog signal path that could be implemented on your virtual console by virtue of the flexibility found in digital technology

In addition to the solution file we have made for this project, you can also refer to our “Mixing Consoles” Max Demo for ideas on how to build the mixing engine.